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(71) Applicant
The Polytechnic of Wales

(Incorporated in the United Kingdom)

Pontypridd, Mid Glamorgan, CF37 1DL, United Kingdom

(72) Inventor
Steven Geoffrey Collins

(74) Agent and/or Address for Service
Urquhart-Dykes & Lord
Cardiff Business Technology Centre, Senghennydd Road, Cardiff, CF2 4AY, United Kingdom

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(56) Documents cited
GB 2193197 A GB 2135291 A GB 1315313 A
GB 0775201 A

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(54) Nested cup stripper

(57) A unit for separating a tubular article such as a rimmed cup from a stack of such articles nested together, comprising a slide element 10 which is mounted for linear movement between two positions. The slide element has one support surface (semicircular) on which the rim of the lowermost article rests, and another support surface (trapezoidal) which moves to below the rim of the next article in the stack as the slide is moved to a second position. A downwardly facing inclined surface bears on the top of the lowermost article to separate it from the stack as the slide moves to its second position.

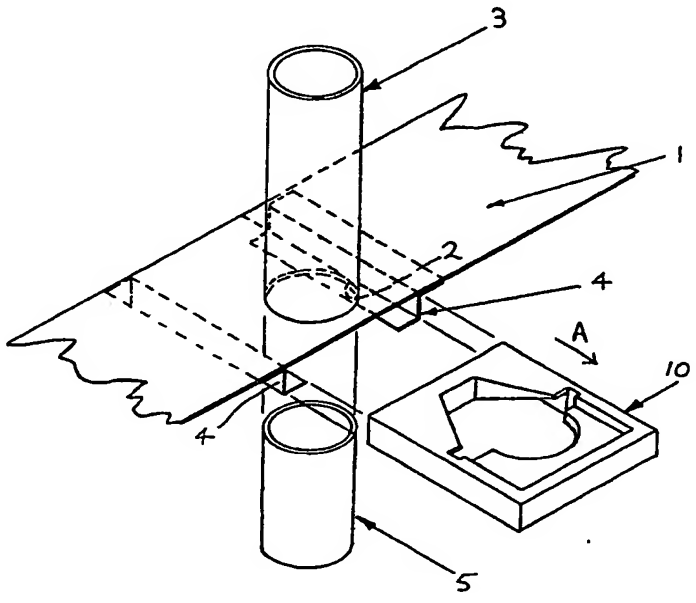

FIGURE 1

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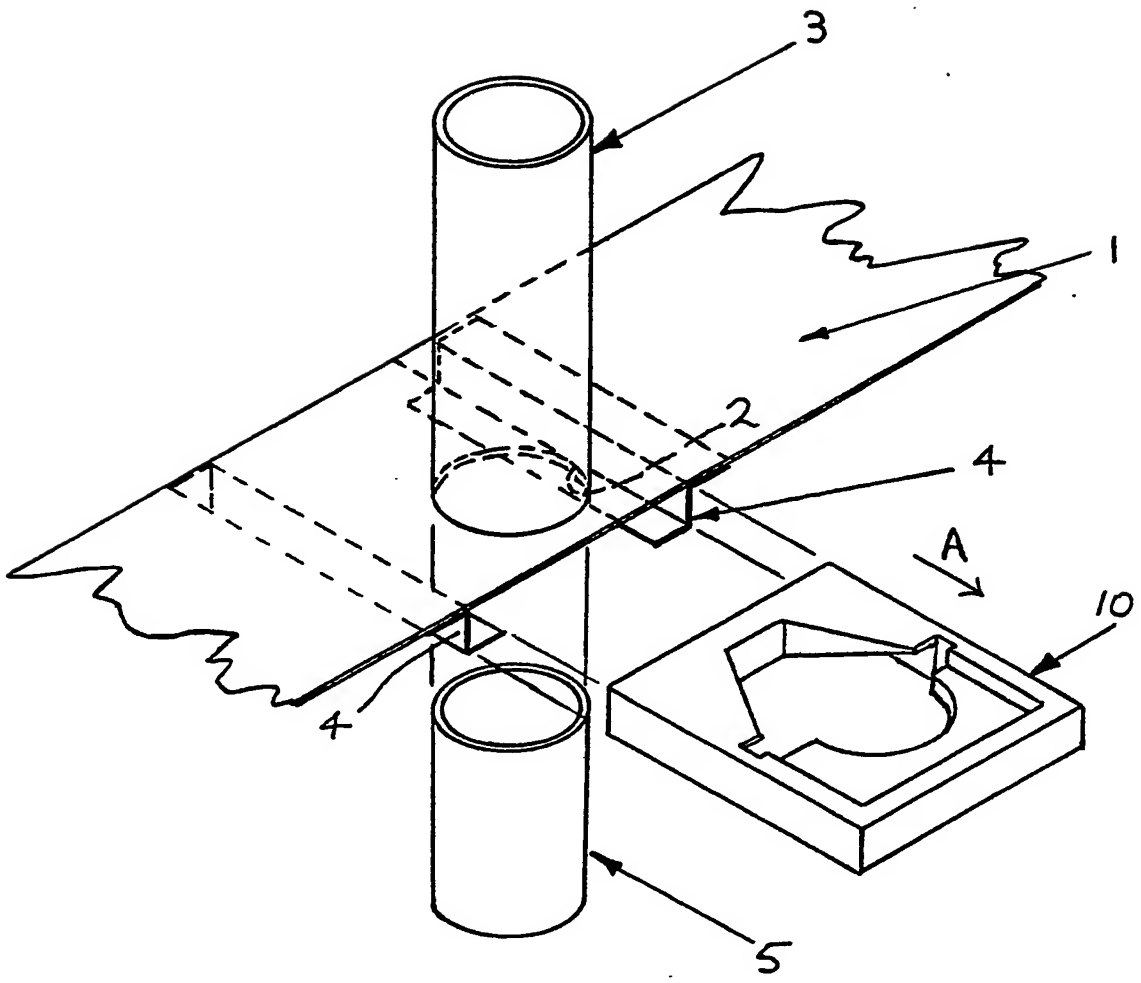

FIGURE 1

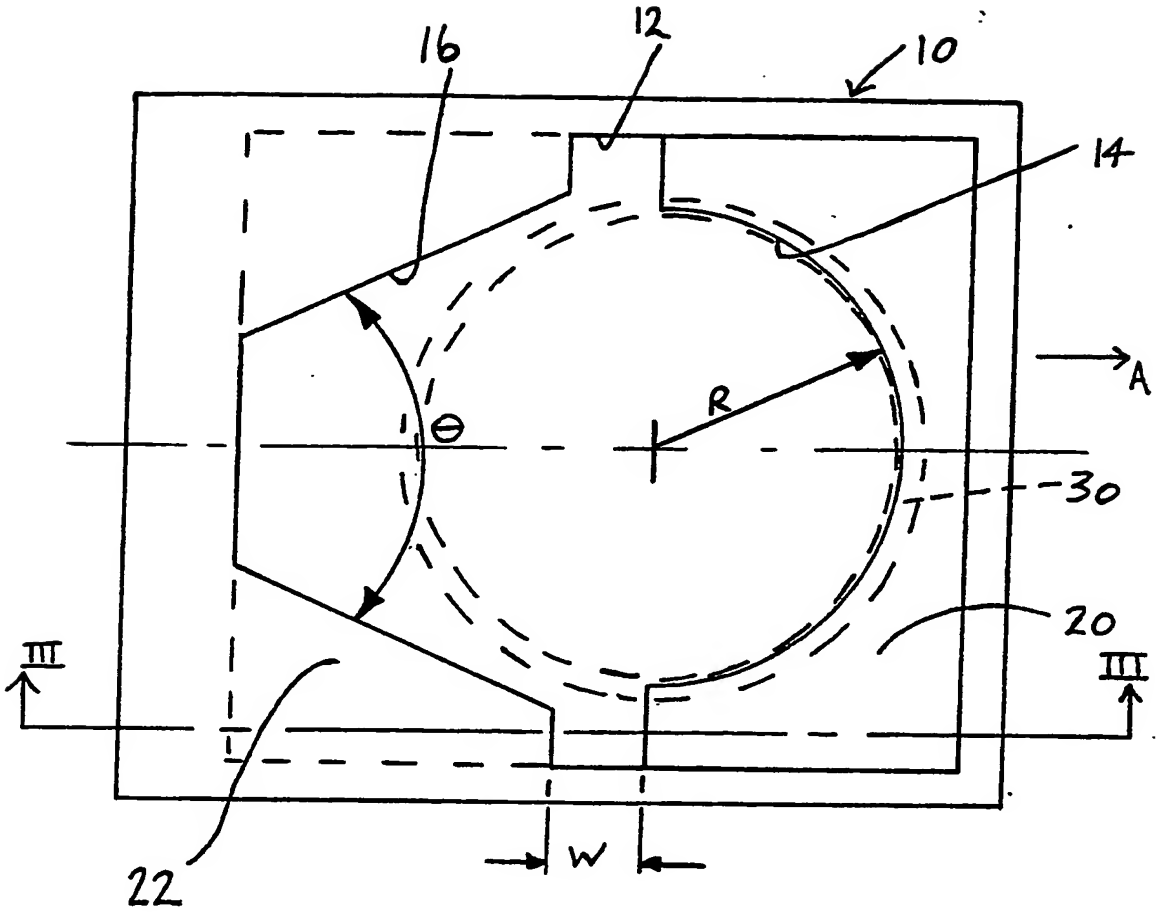

FIGURE 2

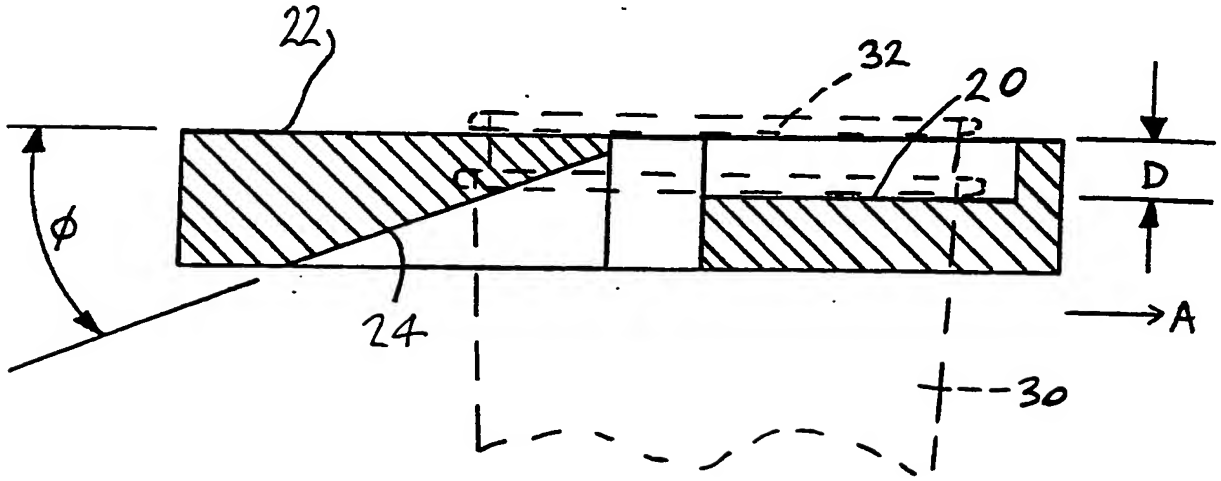

FIGURE 3

Separation Unit

This invention relates to a unit for separating a tubular article from a stack of such articles nested together, each article having a rim or other enlargement in cross-section at or adjacent its top. The invention relates particularly but not solely to a unit for dispensing rimmed cups or other vessels in a vending machine.

It is common in vending machines for rimmed cups or other vessels to be stacked in a vertical column, each cup nesting into the one below. In use, each time a cup is required, the lowermost cup is separated from the stack and dispensed. Hitherto, the separation mechanisms for achieving this have been generally complex and assembled from a large number of parts and limited in their effectiveness and reliability. Also they have occupied considerable space within the vending machine.

We have now devised a separation unit which is simple in construction and use and overcomes the disadvantages of the prior art mechanisms.

In accordance with this invention, there is provided a separation unit for separating a tubular article from a stack of such articles nested together, each article having a rim at or adjacent its top, the separation unit comprising a slide element which is mounted for linear sliding movement between first and second positions, the slide element having a first support surface on which the rim of the lowermost article rests to support the stack when the slide element is in its first position, a second support surface which moves to below the rim of the next lowest article as the slide element moves to its second position, and an inclined surface which bears on the top of the lowermost article to separate it from the stack as the slide element moves to its second position.

Normally the slide element occupies its first position and the stack is supported by the rim of the lowermost

article resting on the first support surface of the slide element. Then in order to separate and dispense the lowermost article, the slide element is moved linearly to its second position: in so doing, the second support surface moves to below the rim of the next lowest article in the stack; also the first support surface is displaced from below the rim of the lowermost article and the inclined surface bears on the top of the lowermost article in a wedging action so as to separate it from the stack. This lowermost article, once separated from the stack, now falls to a collection point, and the stack becomes supported by the rim of next article resting on the second support surface. The slide element can now be slid back to its first or rest position, causing the support for the stack to be transferred from the second support surface to the first support surface, i.e. the rim of the article which is now lowermost comes to rest on the first support surface.

The slide element preferably comprises a one-piece member on which the first and second support surfaces and the inclined surface are formed.

Preferably each of the first and second support surfaces supports the rim of an article around part only of the periphery of the article, the first support surface offering support from one side of the stack and the second support surface offering support from the other side of the stack.

Preferably the second support surface lies generally parallel to but spaced above the first support surface. The first support surface preferably bounds a semicircular portion of an aperture through the slide element. The second support surface preferably bounds two inclined edges to an aperture through the slide element.

Preferably the inclined or wedging surface, which bears on the top of the lowermost article to effect its separation from the stack, is formed on or in the lower side of the slide element and rises from below to above the first support suface.

Each of the support and wedging surfaces may be continuous or discontinuous but sttill serve the purposes described above.

An embodiment of this invention will now be described by way of example only and with reference to the accompanying drawings, in which:

FIGURE 1 is a schematic showing of a separation unit for a vending machine;

FIGURE 2 is a plan view of the slide member of the separation unit;

FIGURE 3 is a section through the slide member on the line III - III of Figure 2.

Referring to Figure 1, there is shown a separation unit for separating a tubular article from a stack of such articles nested together, each article having a rim or other enlargement in cross-section at or adjacent its top. Typically the articles may comprise plastics cups in a vending machine, each cup having a continuous rim at its top, but the separation unit may be used for other articles and in general the rims may be continuous or discontinuous.

The unit which is shown diagrammatically in Figure 1 comprises a base plate 1 formed with a circular aperture 2. A cylindrical feed tube 3 is mounted over the base plate 1, with the lower end of the feed tube 3 registered with the aperture 2 through the base plate 1. A pair of angle members 4 are mounted to the underside of base plate 1 to provide a slideway for a slide member 10. A collection or delivery tube 5 is mounted below the base plate 1 with its axis aligned with the axis of the feed tube 1.

In use, the stack of e.g. plastics cups is disposed within the feed tube 1 and is supported by the rim of the lowermost cup resting on the slide member 10, as will be described below. Each time that a cup or other article is required from the stack, the slide member 10 is slide in the direction of the arrow A from a first or rest position to a

second position, and is then slid back again: this action serves to separate the lowermost cup from the bottom of the stack, and this separated cup falls down through the delivery tube 5. The reciprocal sliding movement of the slide member may be effected manually or a drive unit may be provided, e.g. a solenoid. A return spring may be provided to return the slide member to its rest position.

Referring particularly to Figures 2 and 3, the slide member is a generally flat, rectangular member which is profiled as follows. The member has an aperture formed through it from its upper surface to its lower surface: this aperture comprises a narrow rectangular portion 12 extending across the width of the slide member and itself having a width W, a semicircular portion 14 of radius R and having its centre on the centre of one side of the rectangular portion 12, and a trapezoidal shape portion 16 having its longer side along the opposite side of the rectangular portion 12. The upper side of the slide member is recessed to a depth D around the periphery of the semicircular portion 12 of the aperture, to form a first support surface 20 which is parallel to the top of the slide member but a distance D below it. The top of the slide member around the trapezoidal portion 16 of the aperture forms a second support surface 22. The bottom of the slide member to either side of the trapezoidal portion 16 of the aperture is formed with an inclined surface 24, which rises from the shorter side of the trapezium towards its longer side, and adjacent the longer side is above the level of the first support surface 20.

Referring to Figures 2 and 3 when the slide member 10 is in its first or rest position, the stack of e.g. cups is supported with the rim of the lowermost cup 30 resting on the first support surface 20 of the slide member: the cup itself extends through the aperture in the slide member. Because the lowermost cup is supported around only 180° of its circumference, there is a tendency for the stack of cups to tilt but the feed tube 3 serves to maintain the stack upright. As

the slide member is displaced in the direction of arrow A, the second support surface 22 comes below the rim of the lowest-but-one cup 32: the first support surface 20 moves away from below the rim of the lowermost cup, and also the advancing inclined surface 24 bears onto the top of the lowermost cup 30, at the opposite sides of the latter, exerting a wedging action which separates the lowermost cup from the stack. The lowermost cup then falls from the stack and through the delivery tube 5, and the stack becomes supported by the rim of the cup 32 resting on the second support surface 22. The slide member is then returned to its rest position, causing the stack to drop until the rim of the cup 32, which is now the lowermost cup, rests on the first support surface 20.

When the stack has become short in height (i.e. few cups are remaining), the feed tube 3 may be unable to maintain the stack upright, particularly when the wedging surface 24 is bearing upon the top of the lowermost cup during a separation cycle therefore tending to tilt the stack. However, the delivery tube 5 abuts the lowermost cup to prevent such tilting: a stop member can be provided instead of the delivery tube 5 for this purpose.

It will be appreciated that the dimensions of the aperture through the slide member (particularly the width W, depth D, radius R and angle C between the inclined sides of the trapezium and the angle C of the wedging surface) are chosen in dependence upon each other to suit the particular size and shape of the cups or other articles to be dispensed from the unit.

It will be appreciated that the separation unit serves to dispense the e.g. cups one-at-a-time by means of a simple linear reciprocation of the one-piece slide member 10. The distance through which the slide member moves is very small. the separation unit is therefore of simple and compact construction and is effective and reliable in operation.

CLAIMS

1. A separation unit for separating a tubular article from a stack of such articles nested together, each article having a rim at or adjacent its top, the separation unit comprising a slide element which is mounted for linear sliding movement between first and second positions, the slide element having a first support surface on which the rim of the lowermost article rests to support the stack when the slide element is in its first position, a second support surface which moves to below the rim of the next lowest article as the slide element moves to its second position, and an inclined surface which bears on the top of the lowermost article to separate it from the stack as the slide element moves to its second position.

2. A separation unit as claimed in claim 1 in which the slide element comprises a one-piece member on which the first and second support surfaces and the inclined surface are formed.

3. A separation unit as claimed in claims 1 or 2, in which the first support surface bounds a semicircular portion of an aperture through the slide element.

4. A separation unit as claimed in claims 1 or 2 in which the second support surface bounds two inclined edges to an aperture through the slide element.

5. A separation unit as claimed in claims 1 or 2 in which the inclined or wedging surface, which bears on the top of the lowermost article to effect its separation from the stack, is formed on or in the lower side of the slide element and rises from below to above the first support surface.

6. A separation unit as claimed in any preceding claim in

which each of the first and second support surfaces supports the rim of an article around part only of the periphery of the article.

7. A separation unit as claimed in any preceding claim in which the first support surface offers support from one side of the stack of articles and the second support surface offers support from the other side of the stack.

8. A separation unit as claimed in any preceding claim in which the second support surface lies generally parallel to but spaced above the first support surface.

9. A separation unit for separating a tubular article from a stack of such articles nested together, the separation unit being substantially as herein described with reference to the accompanying drawings.

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